HORTICULTURE SERIES NO. 488

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The poinsettia has witnessed increasing consumer demand that has been more extensive than that for any other floral crop. This has been a function of the extensive improvements of the poinsettia's quality and lasting life. However, in many U.S. markets, the current profitability of the poinsettia to floral crop producers has been questionable. The future economic viability of the poinsettia to floral producers rests with continued improvements in quality to the consumer, economical production, and profitable pricing.

Profitable production is very much dependent on knowledge and control of production costs. With an understanding of production costs, the major decisions are usually propagating or buying unrooted, callused, or rooted cuttings; selecting product type/size/variety; selecting markets and setting prices. Knowledge of production costs should influence these decisions as these decisions influence production costs.

Through survey research, time and motion studies, and budgeting, the following analysis includes production costs for poinsettias and explains the component costs. A commonly found 4", 5" and 6" branched plant, 1 plant per pot, was selected for the comparison. The cultural practices follow the standard cultural practices as outlined in <u>The Poinsettia Manual</u>.[1]

The major factors that influence cost are the following:

(1) Geographic location such as a high energy area compared to a low energy area. However, under certain circumstances, higher energy cost may negate the advantage of the less usage in a low energy area.

(2) Investment in a production facility such as a glass greenhouse for a high investment facility compared to a plastic greenhouse for a low investment facility.

(3) Propagation phase decision involving the growing of stock plants and the subsequent propagation of cuttings or the purchase of rooted, unrooted, or callused cuttings.

(4) Production scale, meaning the production size in number of poinsettia plants.

(5) Finished plant spacing and the percent efficiency in the space utilized.

(6) Quality of management dependent on the ability of an individual owner-operator to effectively manage operations.

This analysis will involve only the first 3 factors but, the second 3 frequently have an equal influence on cost.

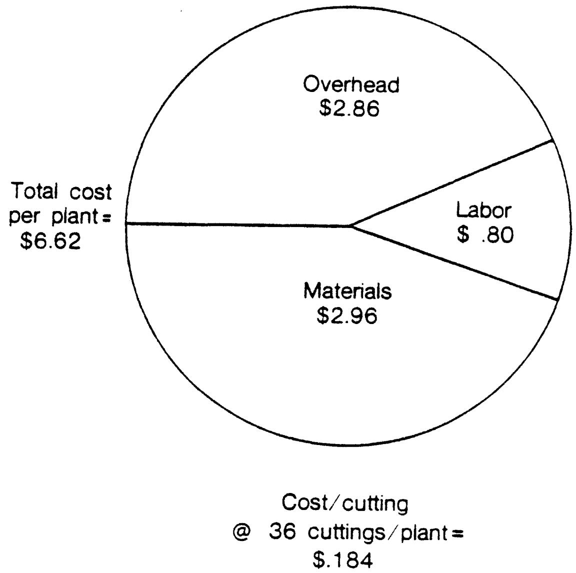
Propagation Phase. The first and initially important factor concerns the decision to buy or propagate a cutting. There are several options available to growers when making the cutting propagation decision, including purchasing an unrooted or callused cutting for further propagation and planting as well as purchase of a rooted cutting for direct planting. The plant material costs, F.O.B. shipping point, normally range:

Unrooted cutting - \$.175
Callused cutting - \$.275
Rooted cutting - \$.425

Stock production requires the purchase of usually a rooted cutting and other materials at a total stock plant material cost of about \$2.96.[2] Overhead charges for the space occupied from April 15 to September 15, were about \$2.86 per stock plant.[3] The labor to plant, maintain the stock plants, and take the cuttings was \$.80 per plant.[4] This results in a stock plant cost of \$6.62 each and a cost per cutting of \$.15 assuming 36 cuttings per stock plant.

To propagate these cuttings to a planting stage, it takes about \$.03 of additional materials, \$.02 of additional labor, and about \$.02 of additional overhead resulting in a finished cutting cost of about \$.22, excluding royalties

Fig. 1. Stock plant and cutting production costs, 1980. [3]



and shrinkage. With royalties, this self-propagated cutting totals about $.245 per cutting, but increases proportionately as shrinkage becomes a factor. Assuming the labor to root a bought unrooted cutting, and a bought callused cutting, and a self propagated stock plant cutting are the same, the costs of the finished rooted cutting are the following:

	Basic cost	With 5% shrinkage	With 10% shrinkage
Self-rooted cutting	$.245	$.258	$.272
Bought unrooted cutting	.245	.258	.272
Bought callused cutting	.345	.363	.383
Bought rooted cutting		$.425	

Based on these assumptions, the costs to propagate cuttings is less than the costs of cuttings purchased ready for planting, but any differences in the quality of cuttings was not considered. The shrinkage effects on increasing cutting costs does illustrate the additional risk associated with poinsettia cutting propagation. Also, the propagation of cuttings by smaller growers particularly those propagating less than 50,000 cuttings annually may be substantially higher due to low volume inefficiencies.

Production phase. The production phase is from mid-September through mid-December. Costs incurred during this period are normally subdivided into 4 categories including overhead, labor, materials, and marketing costs. The only purpose for separating out marketing costs from overhead, labor, and materials is due to its extensive variability among firms with a varying mix of retail and wholesale customers.

Overhead. A less obvious component of production costs is overhead since it remains an indirect cost. It is frequently referred to as greenhouse space cost. Overhead varies by geographic areas as well as by the level of investment. The overhead expenses or fixed costs are the single most important factor influencing poinsettia productions cost and includes such items as fuel, maintenance, insurance, taxes, interest on the capital investment, and depreciation.[5]

Many growers have used a poinsettia marketing-pricing strategy of pricing below a level that would allow them to recover material, labor and marketing costs but not all overhead expenses. This strategy can be justified if some other crop carries more than its share of overhead or as a short-run strategy to generate cash-flow for firm operations. However, it is a very risky strategy as profits are not earned to provide a return on investment as a fair reward for investment and risk. Many firms have witnessed serious problems servicing their debt with these marketing methods as it takes precise knowledge of production costs. Nonetheless, pricing to recover all overhead expenses is the only prudent long-run strategy.

For this analysis, the capital investment was considered to be at replacement costs. Land cost was assumed to be an independent investment factor. Level of investment was assumed to be a production decision based on energy requirements, available capital, and preference for production practices. There were two different energy levels and two different investment levels used in the analysis:

High Energy Use Area (Midwestern and Eastern U.S.)

Low Investment Facility (double-layer poly)[6]

High Investment Facility (glass)[7]

Low Energy Use Area (Florida, Texas, S. California)

Low Investment Facility (single-layer poly)[8]

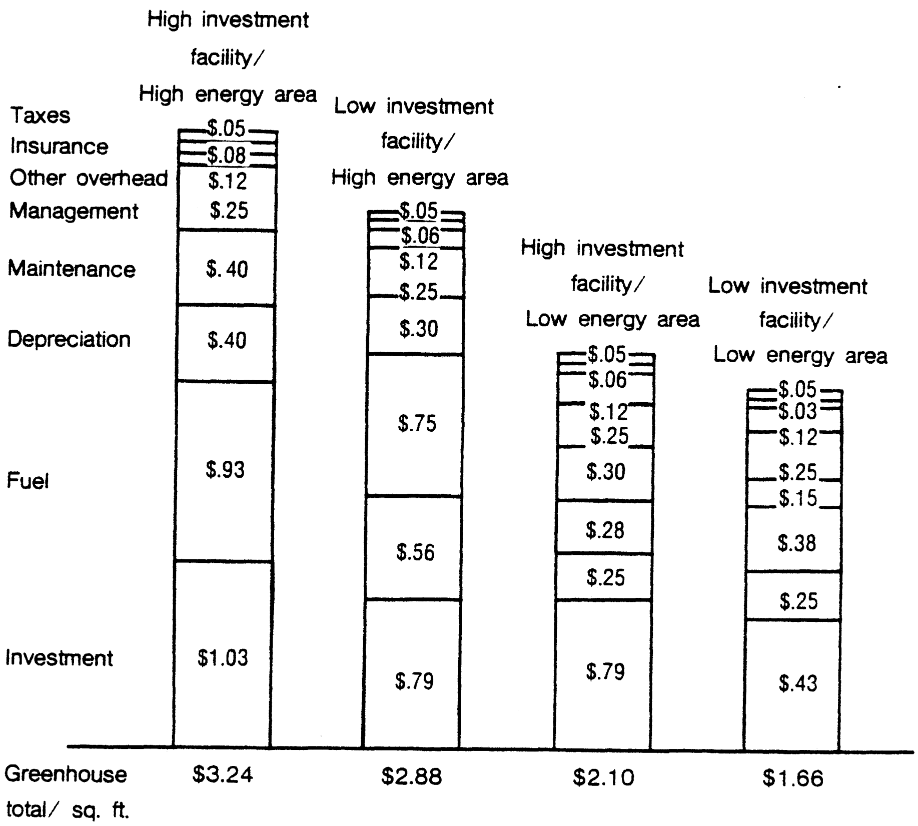
High Investment Facility (glass)[9]

Maintenance, investment, and insurance were calculated on a percentage basis. Taxes, management costs and other overhead were considered to be constant for both levels of investment and geographic areas. While this approach tends to under-estimate some expenses, it over-estimates some others. Individual producers should substitute their own expenses.

Fuel cost for late 1980 was estimated to be based on the use of natural gas at \$3.34/MCF or \$.45/100,000 BTU for a high energy area. Using the conductivity index, it was estimated that double-layer poly structures used 60% of this. While fuel use in a sunbelt area was assumed to be 70% less for individual producers, higher energy cost may substantially decrease this relative cost difference.[10]

The annual overhead expense for a square foot of greenhouse area ranges from \$1.66 - \$3.24 depending on the level of investment and energy use. Assuming that the plants are placed on the bench pot-to-pot in September and final spaced in October, the following are the approximate overhead expenses for 4", 5" and 6" single stem poinsettias.

Figure 2. Annual overhead expenses per square foot of greenhouse area, 1980.

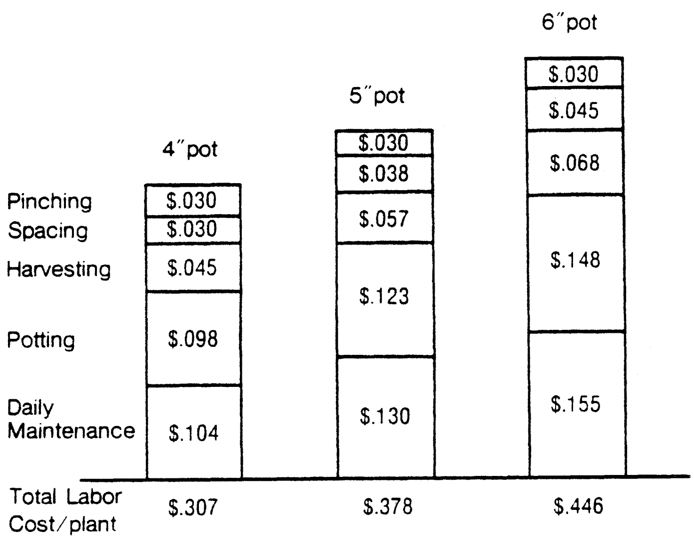


	Pot size	High investment facility $/pot	Low investment facility $/pot
High energy area	4"	.425	.312
	5"	.877	.644
	6"	1.269	.932
Low energy area	4"	.221	.175
	5"	.455	.361
	6"	.659	.522

These were derived using a 67% space utilization, an actual square foot bench cost for poinsettias of $1.58 for a high investment facility in a high energy use area, $1.16 for a low investment facility in a high energy use are, $.82 for a high investment facility in a low energy use area and $.65 for a low investment facility in a low energy use area. For some producers, the space occupied may start before September 15 and extend beyond December 15, which would inflate the overhead proportionately. It is assumed that the occupied space after December 15 would be allocated to the next major crop.

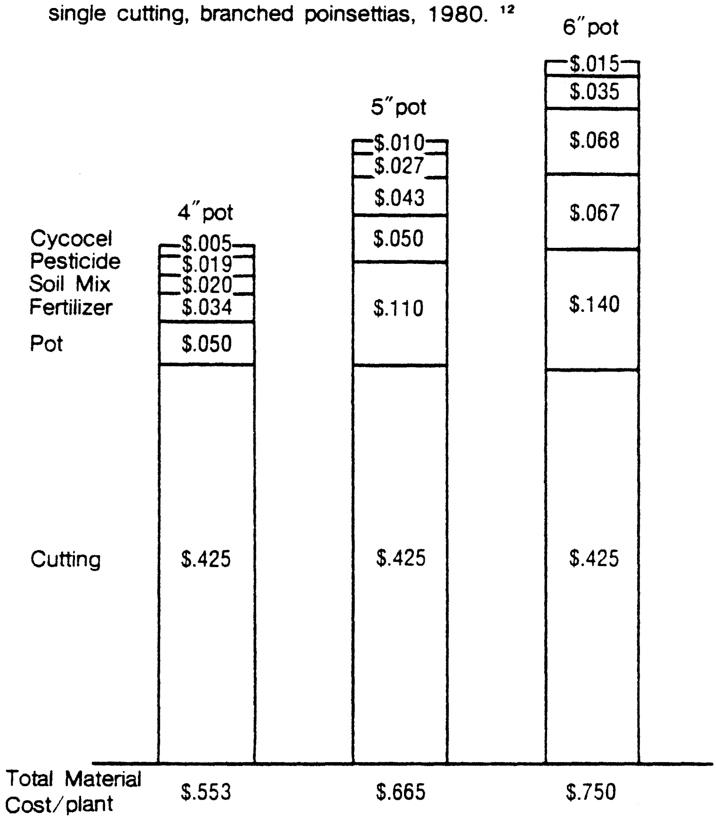
Labor. Direct labor includes the potting, pot moving, pinching, daily maintenance, and harvesting activities of poinsettia production. Poinsettia production is not considered to be a labor intensive crop compared to crops such as pot mums, with 6" poinsettias having $.45 of direct labor per plant using an effective wage rate of $3.50/hour including fringe benefits. This labor charge excludes all marketing labor. The most labor intensive activity is the potting and moving of the plants as well as the daily watering and spraying maintenance activities. If the wage rate were higher for individual producers due to added supervisory capacity of individual employees, this has already been included as an overhead expense. Individual producers should increase or decrease this expense dependent on their own wage rate or own efficiencies in labor use.

Figure 3. Labor cost for producing 4″, 5″, and 6″ single cutting, branched poinsettias, 1980. ''



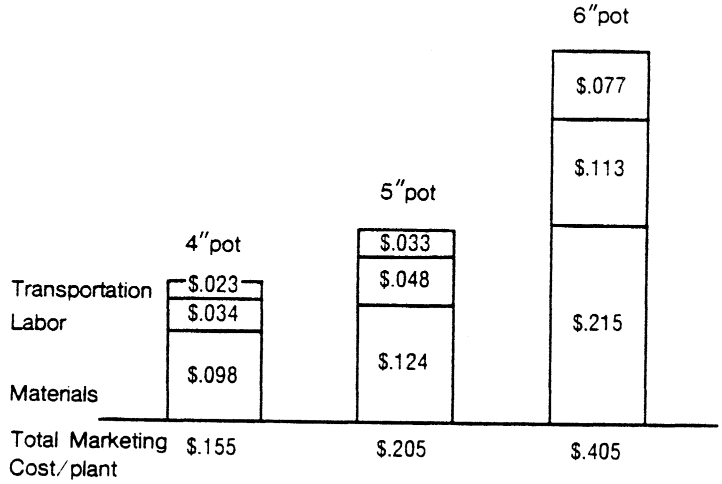
Materials. Production materials account for a major component of poinsettia production approximating \$.55, \$.67, and \$.75 for a 4", 5" and 6" plant, respectively. The cutting is the major material cost accounting for 57% of total material cost. This usually makes direct material cost the easiest component cost to calculate. Of course, with successful propagation of cuttings, a grower could reduce the materials cost.

Figure 4. Material costs for producing 4",5",and 6" single cutting, branched poinsettias, 1980.[12]



Marketing costs. The marketing charges such as sleeving, boxing, and subsequent labor and transportation charges are a cost for poinsettia producers. Marketing cost amounts to about \$.16, \$.21, and \$.41 for a 4", 5", and 6" plant, respectively, but of course increases substantially as the market radius increases.

Figure 5. Marketing cost for marketing 4",5", & 6"single cutting, branched poinsettias, 1980. [13]



Total production costs. An average production cost for a 6" poinsettia is about \$2.12 - \$2.87 per finished plant as overhead, materials, labor, and marketing costs account for 44%, 26%, 16%, and 14%, respectively. The following is an estimate of the unit production cost with and without a shrinkage factor of 5% for both levels of investment and energy areas:

	Per 6" plant	Per 6" plant with 5% shrinkage
High energy, high investment	\$2.87	\$3.02
High energy, low investment	2.53	2.56
Low energy, high investment	2.26	2.37
Low energy, low investment	2.12	2.23

The total cost for 4", 5" and 6" poinsettia plants was \$1.44 for a 4", \$2.13 for a 5", and \$2.87 for a 6" plant:

Item	4" plant ($/plant)	5" plant ($/plant)	6" plant ($/plant)
Overhead	.425	.877	1.269
Labor	.307	.378	.446
Materials	.553	.665	.750
Marketing costs	.155	.205	.405
	$1.442	$2.125	$2.870

Assumption: High energy use area, high investment facility.

Energy Use

Assuming a low level of investment such as for a plastic greenhouse and a 70% fuel use difference between a low and high energy use area, production costs are about 18%-21% less in a low energy area compared to a high energy area. The difference is due to differences in fuel use and investment requirements. If greater space efficiency through close spacing can be employed in a low energy, higher light area a greater difference could be realized. While low energy use areas can realize substantially lower unit production costs, frequently market prices are correspondingly lower. Also, in some areas of the U.S., energy cost is frequently double that in other areas.

	High energy Use area			Low energy Use area		
	Plant size			Plant size		
	4"	5"	6"	4"	5"	6"
Overhead*	.312-.425	.644-.877	.932-1.269	.175-.221	.361-.455	.522-.659
Labor	.307	.378	.446	.307	.378	.446
Materials	.553	.665	.750	.553	.665	.750
Marketing cost	.155	.205	.405	.155	.205	.405
	1.327-1.673	1.892-2.125	2.533-2.870	1.190-1.236	1.609-1.703	2.123-2.260

*The difference is due to the use of a glass or poly greenhouse.

Other Important Factors. Historically, the most important factor influencing production costs is the productivity of the bench use. In recent years, the productive capacity of floral production operations has increased due to more efficient use of greenhouse facilities. Productivity gains can be made in four areas:

1. Space efficiency - more rapid turnover or more intense spacing
2. Labor efficiency - more efficient use of labor
3. Margin gains - increased margins
4. Lower unit cost - using more efficient production technology.

For poinsettias, many growers have reduced poinsettia production costs through space efficiency gains. However, in many cases these productivity advantages such as closer spacing may be offset by reduced quality which reduces market price. Price has been determined more important than productivity in influencing margins and profitable floral crop production. As a result, growers must carefully evaluate these trade-offs.

Economics of scale in a production operation has also been an important factor influencing production cost. Scale economies have the effect of reducing poinsettia production costs by allowing the use of unit cost saving production techniques or the purchase of materials at lower prices. Although floriculture was never considered to have significant wide-spread economies of scale, large commercial operations have definite opportunity to purchase inputs in larger quantities or to utilize cost saving production technologies relative to the small family operations. Large firms partially mechanize many operations that are performed manually in small firms such as soil preparation, planting, and pot handling. Seasonality has had an effect of reducing these economies in the floriculture production since facilities are usually built such that capacity utilization is near 100 percent only at peak demand periods.

Since poinsettia production has been shown to have the operational overhead as the greatest cost component, it is logical that larger producers can make cost gains through more efficient use of space and labor saving technologies.

Pricing. After production cost has been calculated, careful consideration should be given to pricing. Pricing has to first take into consideration the number of plants that are dumped or reduced in price. A $2.87 poinsettia production cost increases to $3.19 with a 10% shrinkage [(2.87 ÷ .90) = $3.19]. Thus, shrinkage if not considered, could easily eliminate all profits.

Secondly, a desired return-on-investment is important to pricing. If a grower has $10/sq.ft. tied-up in inventory, greenhouse, equipment and other assets, an annual revenue of $10/sq.ft. results in a sales/asset productivity of 1 ($10 in sales ÷ $10 in assets). Thus, a 25% mark-up on poinsettias would result in a 25% return on sales as well as assets. For a 25% return, a $2.87 poinsettia with a 10% shrinkage, should be priced at $4.00 [($2.87 ÷ .90) x 1.25 = $4.00]. Therefore, the greater the investment or lower the sales on a square foot basis, the higher the required margin and visa versa.

Summary

Poinsettia production and marketing could be as low as about $2.12 or as high as $2.87 per 6" plant. This difference is in excess of 35% and shows the importance of accurate knowledge and control of production costs on crops such as poinsettias. Individual grower cost could vary by much more depending on efficiencies in energy, space, and production practices. It also stresses the importance of developing a marketing program allowing growers to sell at profitable prices taking into account their own specific costs.

This cost study has been a benchmark for poinsettia growers to begin to compare their costs to the industry norm. The methods are meant to result in approximations and no grower should take these costs to be representative of their operation. Hopefully in the future, these can be refined using more information and more refined tools.

Notes, References and Assumptions

1. Ecke, Paul, Jr. and O. A. Matkin (Editors). 1976. The Poinsettia Manual. Paul Ecke Poinsettias. pp. 205.

2. Total material expense includes the pot, cutting, growing media, fertilizer, pesticide, and other materials.

3. Total overhead expenses including all indirect greenhouse space cost from April 15 through September 15. This includes opportunity cost for alternative use of facilities.

4. Total labor expense includes planting stock plants, maintenance of stock plants, and taking cuttings, excluding all indirect labor charges which are included in overhead expenses.

5. Natural gas was at $3.32/MCF. The fuel use was only 60% of this for a low investment facility (double layer poly) in a high energy area. Fuel use was assumed to be 70% less in a low energy area for for both a high and low investment facility. The depreciation for the structure and equipment was straight line using 20 years for a glass greenhouse, 10 years for a plastic greenhouse, and 5 years average depreciation on all equipment. Annual plastic replacement was included as a maintenance charge. Maintenance costs for the equipment and structure were assumed to be 5% per year of the initial investment for a plastic and glass greenhouse in both a high and low energy area. Interest on investment was calculated at 12% of the average investment including inventory. Insurance was calculated at 1% per year of the initial investment for a plastic and glass greenhouse in both a high and low energy area. Property taxes were assumed to be $.05 per square foot of greenhouse area. For both areas and levels of investment, miscellaneous overhead including all other indirect expenses were assumed to be $.12 per square foot of greenhouse area and management cost was assumed to be $.25 per square foot of greenhouse area. The overhead for poinsettias was assumed to be the share of the annual overhead from mid-September through mid-December.

6. A low investment facility in a high energy area was a double layer poly greenhouse at an initial investment of $6 per square foot of greenhouse area including equipment.

7. A high investment facility in a high energy area was a glass greenhouse at an initial investment of $8 per square foot of greenhouse area including equipment.

8. A low investment facility in a low energy area was a plastic greenhouse with single layer poly at an initial investment of $3 per square foot of greenhouse area including equipment.

9. A high investment facility in a low energy area was a glass greenhouse similar to the high energy area, but the initial investment was $6 per square foot of greenhouse area including equipment.

10. Based on information from Grower Talks, April 1977, "You can control full costs" and Ohio Florists' Assn. Bulletin, No. 563, September 1976, "Fuel usage - a survey of Northeastern Ohio greenhouse growers" as well as current surveys.

11. Based on the time and motion studies of Robert Bernacchi of La Porte, IN at the 1975 Ohio Florist Short Course and using a $3.50 wage including fringe benefits. It was assumed that the labor was only 87.5% efficient or 12.5% of the labor was wasted on non-productive activities. All supervisory labor was included as a management cost.

12. Includes the use of Cycocel as a spray, Truban, Benlate, SBP-1382 and Temik. Soil cost was calculated at $35 per cubic yard.

13. Includes the purchase of sleeves at $.04 - $.05 ea, boxes at $.90 each, and care tages at $.014 each. The transportation charge was calculated for a trailer load of 3,000 plants at a market radius of 100 miles at a cost per mile of $1.15. The labor charge was to load and unload and was calculated at 75 manhours at $4.50 per hour average wage and non-wage labor cost.

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